

1. (Amended) A medical filter, comprising
a chamber, having
an interior,
a patient connection, in open fluid communication with said interior and adapted for
connection to a dialysis solution flow fixture carried by a dialysis patient,
a transport connection, in open fluid communication with said interior and adapted for
connection to external dialysis solution containment apparatus;
support structure, mounted within said interior, structured as a thin, perforated member, having a
support surface;
hydrophilic filter medium mounted atop said support surface, having a pore size capable of
separating particulate materials from fresh dialysis solution;
first channel structure within said chamber defining a first flow path from said patient connection
across the surface of said filter medium to said transport connection;
second channel structure within said chamber defining a second flow path from said transport
connection through said filter medium and said support structure to said patient
connection; and
flow control mechanism mounted within said chamber and operable to direct fluid from said
patient connection through said first channel structure and to direct fluid from said
transport connection through said second channel structure.

2. A medical filter according to Claim 1, wherein said second channel structure
includes a portion in communication with an air vent structure constructed and arranged to
release air from solution flowing through said interior while retaining said solution within said
interior.

3. A medical filter according to Claim 2, wherein said air vent structure includes a
hydrophobic membrane positioned in the travel path of air through said vent structure.

4. (Amended) A medical filter according to Claim 1, wherein

said support structure comprises an inner conduit, with an open interior defined by a first wall, having a first end, a second end and a perforated section between said first and second ends;

said first channel structure is structured to accommodate flow through said inner conduit;

said flow control mechanism comprises a check valve positioned at said second end, structured and arranged to permit flow from said inner conduit through said transport connection;

said inner conduit is positioned with an outer housing structured and arranged to define second channel structure exterior of said perforated section;

said filter medium is positioned adjacent said perforated section such that fluid flow from said fluid passageway to said open interior must pass through said medium; and

said flow control mechanism further comprises valve means at said first end, structured and arranged to permit fluid flow from said second channel structure, through said perforated section, through said open interior and out said patient connection.

5. A medical filter according to Claim 4, wherein said second channel structure includes a portion in communication with an air vent structure constructed and arranged to release air from solution flowing through said interior while retaining said solution within said interior.

6. A medical filter according to Claim 5, wherein said air vent structure includes a hydrophobic membrane positioned in the travel path of air through said vent structure.

7. (Amended) A medical filter according to Claim 1, wherein said filter medium comprises thin sheet material configured to cover the perforations of said support structure.

8. A medical filter according to Claim 7, wherein said filter medium comprises a micro porous membrane.

9. A medical filter according to Claim 8, wherein said membrane has a pore size of approximately 0.2 μm .

10. A medical filter according to Claim 8, wherein said membrane is constructed of polyethersulfone.

11. A medical filter according to Claim 10, wherein said membrane has a pore size of approximately $0.2\ \mu\text{m}$.

12. A medical filter according to Claim 1, wherein
said chamber has an interior defined by a bottom portion and a cover portion,
said support structure mounted within said interior is formed from spaced, perforated top and
bottom panel members, joined by perforated edge members to define a space constituting
an interior flow path between said panel members;
said first channel structure within said chamber includes first and second segments structured and
arranged so that liquid from said patient connection is directed by said first segment,
through said perforated edge members and across said interior flow path to said second
segment; and
said second channel structure within said chamber is structured and arranged to direct liquid from
said transport connection, around the exterior of said support structure, through said filter
medium into said space and through said perforated edge members to said patient
connection; and
said flow control mechanism mounted within said chamber is structured and arranged to permit
liquid flow from said second segment to said interior.

13. A medical filter according to Claim 12, wherein said bottom portion is a
substantially rectilinear box. and said support structure is oriented to hold sheets of filter medium
approximately parallel the direction of flow of liquid traveling from said patient connection
towards said transport connection.

14. A medical filter according to Claim 12, wherein said flow control mechanism is positioned in fluid flow communication with said second segment of said first channel structure, and is arranged to direct liquid from said second segment to the exterior of said support structure.

15. A medical filter according to Claim 12, including a plurality of said support structures mounted in spaced parallel relationship within said chamber.

16. A medical filter according to Claim 15, wherein said bottom portion is a substantially rectilinear box, and said support structures are each oriented to hold sheets of filter medium approximately parallel the direction of flow of liquid traveling from said patient connection towards said transport connection.

17. A medical filter according to Claim 15, wherein said flow control mechanism is positioned in fluid flow communication with said second segment of said first channel structure, and is arranged to direct liquid from said second segment to flow parallel, between and across the exteriors of said support structures.

18. A medical filter according to Claim 17, wherein said second channel structure includes a portion in communication with an air vent structure constructed and arranged to release air from solution flowing through said interior while retaining said solution within said interior.

19. A medical filter according to Claim 18, wherein said air vent structure includes a hydrophobic membrane positioned in the travel path of air through said vent structure.

20. A medical filter, comprising
an inner conduit, with an open interior defined by a first wall, having a first end, a second end
and a perforated section between said first and second ends;
a flow channel at said first end, structured to accommodate flow into or out of said inner conduit;
a check valve at said second end, structured and arranged to permit flow from said inner conduit;

an enclosure for said inner conduit, structured and arranged to define a fluid passageway exterior said perforated section;

a filter medium positioned adjacent said perforated section such that fluid flow from said fluid passageway to said open interior must pass through said medium, said medium being hydrophillic and capable of blocking bacterial-sized particles; and

valve means at said first end, structured and arranged to permit fluid flow from said open interior but to direct fluid flowing in the opposite direction into said fluid passageway.

21. (Amended) A medical filter, comprising

a container with an interior volume in open fluid communication with a patient connection element and a transport connection element;

filter support structure mounted within said interior volume and including a plurality of filter elements arranged in approximately parallel stacked arrangement, whereby to define a plurality of approximately parallel flow paths straddling said filter elements, each said filter element including

first and second panel members, each having an exterior surface and an interior surface with apertures extending between said exterior and interior surfaces,

first and second edge members connecting said panel members at the respective interior surfaces of said panel members, whereby to enclose an interior fluid flow zone within said filter element, said edge members having exterior and interior surfaces and carrying ports arranged to permit liquid to pass through said first edge member, through said flow zone between opposed said edge members and out said second edge member,

hydrophilic filter medium mounted to the exterior surfaces of said first and second panel members to cover said apertures; and

flow control structure within said interior volume constructed and arranged to:

cause liquid introduced through said patient connection element to flow through said first edge member, through said zone, out said second edge member, and then across said exterior surfaces of said panel members to said transport connection element; and

cause liquid introduced through said transport connection element to flow into said interior volume to surround said filter elements, through said filter medium into said interior zone and out said ports in said first edge member to said patient connection element.

22. (Amended) A medical filter according to Claim 21, further including a channel structure having a portion in communication with an air vent structure constructed and arranged to release air from a solution flowing through said interior volume while retaining said solution within said interior volume.

23. A medical filter according to Claim 22, wherein said air vent structure includes a hydrophobic membrane positioned in the travel path of air through said vent structure.

24. A medical filter according to Claim 21, wherein said filter medium comprises thin sheet material configured to cover the perforations of said support structure.

25. A medical filter according to Claim 24, wherein said filter medium comprises a micro porous membrane.

26. A medical filter according to Claim 25, wherein said membrane has a pore size of approximately $0.2\ \mu\text{m}$.

27. A medical filter according to Claim 25, wherein said membrane is constructed of polyethersulfone.

28. A medical filter according to Claim 27, wherein said membrane has a pore size of approximately $0.2\ \mu\text{m}$.